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HOT-WATER TREATMENT OF DORMANT AND SPROUTED SEED CANE¹

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A hot-water treatment to kill insect pests (especially the moth borer and the mealybug) on seed cane has been suggested by Brandes,² who found in laboratory experiments that a temperature could be chosen that was effective in killing these pests which did not kill the dormant eyes on the cane. He found, further, that the eyes were actually stimulated by this treatment. These results were verified on a larger scale by Holloway, Haley, and Ingram.³ The treatment suggested by these experimenters was 20 or 30 minutes in water held at 50° C. (122° F.) and continually agitated.

In the spring of 1923 at Cairo, Ga., while the writer was working with cane that had sprouted badly in the banks, it occurred to him that this treatment, which left dormant eyes uninjured, might have a different effect upon the more tender sprouted eyes. In cooperation with J. W. Ingram,¹ junior entomologist, Bureau of Entomology, United States Department of Agriculture, he found that nearly all the sprouted eyes were killed by a treatment for 30 minutes at 50° C. (122° F.), and therefore serious losses must be expected where badly sprouted cane is thus treated for planting.

In September, 1923, Brandes and Klaphaak² at Canal Point, Fla., carried out further tests with cane that, while growing in dense clumps on muck soil, had developed numerous sprouted eyes. On the basis of these tests they suggested a milder treatment of sprouted cane, consisting of preheating the cane for 20 minutes at 46° C. (114.8° F.) and then immediately heating for 10 minutes additional at 51° C. (123.8° F.). They found this treatment effective in killing

¹ This circular contains information which has been acquired as the result of experiments conducted since the issue of the following Department Circular: Yoder, P. A., and Ingram, J. W. Hot-water treatment of sugar cane for insect pests.—A precaution. U. S. Dept. Agr. Cir. 303, 4 pp. 1923.

² Brandes, E. W., and Klaphaak, P. J. Growth stimulation and pest and disease control by hot-water treatment of sugar-cane "seed." *In Louisiana Planter*, vol. 71, pp. 371-372, 392-394, 412, illus. 1923.

³ Holloway, T. E. Sugar-cane insects in 1922. *In Louisiana Planter*, vol. 70, pp. 70-71. 1923.

the insect pests, and it was not noticeably injurious to the open-air sprouts.

In the spring of 1924 the writer carried out at Cairo further tests with cane sprouted in the banks. Sprouted and unsprouted lots of cane of the Cayana variety (Chinese type) in cuttings from 10 to 15 inches in length were treated in the following three ways:

Preheating 20 minutes at 45° C. (113° F.) followed immediately by 10 minutes at 50° C. (122° F.).

Preheating 20 minutes at 46° C. (114.8° F.) followed immediately by 10 minutes at 51° C. (123.8° F.).

Heating 20 minutes at 50° C. (122° F.).

In each case the cuttings were planted within 30 to 40 minutes from the time of removal from the hot water. The soil was well pulverized at the time of planting and in fine condition as to moisture during the period of the test. The results from these tests are shown in Table 1.

TABLE 1.—*Effect of hot-water treatments on dormant and sprouted seed cane at Cairo, Ga., in 1924*

Lot No.	Initial condition of eyes	Preheating		High heating		Period till final observation	Eyes			Percentage of growing eyes	Length of sprouts
		Time	Temperature	Time	Temperature		Growing	Doubtful	Dead		
1	Dormant	Min.	°C.	°F.	Min.	°C.	°F.	Days			Inches
2	do	20	45	113	10	50	122	11	46	50	92.0 .66
3	do	(1)	(1)	(1)	(1)	(1)	(1)	11	46	49	93.9 .56
4	Sprouted				20	50	122	11	45	49	91.8 .44
5	do	20	45	113	10	50	122	11	20	27	50 40.0
6	do	20	46	114.8	10	51	123.8	11	24	4	21 49 49.0
								16	2	31	49 32.7

¹ Not treated.

The tests in 1923 by Yoder and Ingram⁴ referred to above, with which the present series should be compared, indicated that practically all sprouted eyes when planted without treatment grew and that 30 minutes treatment at 50° C. (122° F.) to 51° C. (123.8° F.) killed nearly all the sprouted eyes. The additional tests this year show that by each of these three methods of treatment of sprouted eyes a considerable number of sprouts were left alive, although in all cases more than half the sprouts were killed. The results indicate a slight preference for the milder two-heat treatment, 20 minutes at 45° C. (113° F.), followed by 10 minutes at 50° C. (122° F.), provided this is effective in killing the insect pests. The tests here recorded did not include tests of efficiency in killing the insects. The stronger two-heat treatment, 20 minutes at 46° C. (114.8° F.), followed by 10 minutes at 51° C. (123.8 F.), left a smaller percentage of sprouts alive than did the one-heat treatment of 20 minutes at 50° C. (122° F.).

With reference to the stimulating effect of the hot-water treatments upon the sprouting of the dormant eyes, there is marked stimulation by both the one-heat and the milder two-heat treatments. After 11 days not only were the sprouts decidedly longer but the

⁴ Yoder, P. A., and Ingram, J. W. Op. cit.

root system showed an even more marked stimulation. In the treated cuttings the rings of rootlets, developed in 11 days, were far more regular and more nearly complete and the rootlets decidedly longer than in the untreated lot.

Assuming any or all of these treatments to be efficient in destroying the insect pests, it appears that the method described will accomplish this result with a loss of only about one-half or two-thirds of the sprouted eyes and with a marked stimulation to growth of the dormant eyes, effective if the cane is planted immediately after the treatment. Some such method of treatment therefore has great value in keeping in check the infestation of cane plantings with moth borers, mealybugs, and other insect pests which are harbored on the seed cane. It should especially find application in planting nursery plats for future seed-cane supplies and in seed cane that is to be transported from an infested to an uninfested area.

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This bulletin is a contribution from
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